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ENTOMOLOGICAL WORK PLAN
for the
BURNEY-McCLOUD INSECT CONTROL PROJECT

The Burney-McCloud insect control project, which is now being organized as a cooperative undertaking by Federal, State and private agencies within the zone of infestation set up by the California State Forester, has as its objective the halting of a serious outbreak of bark beetles in ponderosa pine stands. The principal insects involved are Ips engraver beetles (Ips confusus and Ips oregoni) and the western pine beetle (Dendroctonus brevicomis), but flathead borers and other tree-killing insects are involved to a lesser extent.

In its role as advisory entomological consultant, the Berkeley Forest Insect Laboratory of the U. S. Bureau of Entomology and Plant Quarantine has been called upon to outline the necessary entomological requirements of the project and will be expected to supervise the spotting of infested trees to be treated or salvaged, to recommend and supervise methods of treatment, and to inspect the work from time to time to see that it is being adequately performed. The Laboratory will designate a representative to be in charge of the Bureau's contribution to the project and two or more field aids to help with instruction, training and supervision. The laboratory will work in close cooperation with the State Division of Forestry, the U. S. Forest Service, and private timber owners and will attempt to maintain uniform standards on all jobs irrespective of ownership.

General Objectives

The two basic objectives of the present control project are:

(1) To break up the present increasing epidemic infestation by destroying the maximum number of beetles at the least possible cost.
(2) To utilize through logging and salvage the maximum amount of timber destroyed by insects.

These objectives require the integration of entomological techniques with administrative and fiscal considerations and the practical problems of logging out scattered infested trees at a time of year when many difficulties may be expected to present themselves. Therefore the job is going to require the fullest possible cooperation of all agencies concerned with the different phases of the project. The present work plan concerns itself primarily with the entomological phases.

(distribution list on reverse side)

Entomological Requirements

In order for the project to be successful in controlling this bark beetle outbreak, certain requirements are essential in respect to the extent of area to be treated, the disposal of infested trees, and the timing of the control work.

Entomological Units.

One of the first requirements is that all infestation representing the overwintering generation of bark beetles should be disposed of within an entomological unit before the beetles emerge in the spring. While no one knows just how far bark beetles may fly to attack timber, we do know that it is of little avail to treat a portion of contiguous timber and leave adjacent infested timber untreated. Therefore entomological units are those bodies of timber which are considered to be intra-dependent for control purposes and are separated from other bodies of timber by openings, high ridges or other natural barriers, or if no such barriers exist are large enough so that the chances of reinfestation from the outside may be considered as reduced to a minimum.

Within the Burney-McCloud zone of infestation, the following entomological units are recognized which should be treated this spring. The boundaries of these units are shown on the attached map.

The priority of treatment from the standpoint of the intensity of infestation and need of control is as follows:

1. Burney Flat unit
2. Goose Valley unit
3. Clark Creek unit
4. Soldier Mountain unit
5. Doyle Butte unit
6. Hat Creek unit
7. Dry Lake unit
8. Big Springs unit
9. McCloud Flat unit

From the standpoint of timber values at stake, the priority for control may be in a different order, but it is expected that all of the above units can be covered in the spring control program of this year.

Within each unit there are certain "hot spots" of infestation which take precedence over the more scattered type of infestation. Large group concentrations of Ips should be treated first because of the necessity of destroying these broods at an early date before they start to emerge. But in any case, an entire unit should be completely covered with spotting and all group infestation treated in order to be assured of favorable control results.

Spotting

Success of direct control depends upon disposal of the highest possible percentage of the bark beetle population considered as primary tree-killing species present on the area in epidemic numbers. Treatment of other insect species must be considered as secondary to the main purpose. Therefore on this project the principal insects to be treated are (1) Ips engraver beetles (Ips confusus and I. oregoni) and (2) the western pine beetle (Dendroctonus brevicomis). Trees infested with flatheads (in the advenced stages), mountain pine beetle (Dendroctonus monticolae) and Ips emarginatus will be included in the treatment, even though these are relatively few in number.

Classes of Trees

Trees to be spotted may be grouped into the following classes:

A. Infested trees ("T" trees)

Trees currently infested with overwintering broods of tree-killing beetles, which can be checked by basal examination; or evidence of woodpecker work or pitch tubes on the trunk. These trees which are those normally treated on control projects by fell-peel and burn methods will include:

(1) Ips-killed groups of 3 or more saplings, poles or black-bark trees of young age class under 20 inches d.b.h. Tops may be brown, red or green but the evidence on at least one tree in the group will indicate that all are infested.

(2) Western pine beetle (D.b.) containing overwintering broods as shown by basal samples or woodpecker work; not including summer brood trees over 75 percent abandoned. Tops may be red, sorrel, fading or green.

(3) Flatheads - advanced stages shown by basal examinations.

(4) Mountain pine beetle, Ips emarginatus and other trees with dying cambium at base. Some of these trees may have tree-killing broods in the upper portion of the bole.

B. High risk trees

These include California risk classes 3 and 4 or trees which might be expected to die within the next 10 to 15 years. In the Burney area these classes comprise from 10 to 35 percent of the stand volume, and may be further sub-divided as follows:

(1) Dying - doubtful trees ("D" Trees)

These are trees of highest risk which show progressive dying in the top, fading or other signs of rapid decadence which would indicate that death might be expected within the next 1 or 2 years, but which show normal cambium from basal examination and nothing to indicate degree or extent of

top infestation at the present time. These trees comprise California risk class 4 and have a "penalty score" of 6 and over in the penalty system of rating risk. (See Buckhorn's manual, pages 54A and 54B.)

The spotting of these dying trees from doubtful causes will be limited to areas where salvage logging is practical and will depend entirely upon whether or not the owner desires that they be marked for salvage. From the entomological standpoint, the success of control will be greatly enhanced by removing these highest risk trees; on the other hand, we would not recommend that they be cut and burned on areas where no salvage is possible.

(2) Risk trees

These include the remainder of California risk classes 3 and 4, after the current dying element has been removed. Such trees would normally be marked in a sanitation-salvage logging project. While the removal of these risk trees would be a desirable procedure to hold down losses, it is not contemplated as a part of the present project for the entire area could not be covered with such a logging program in the time available. The present project is concerned primarily with direct control and salvage of infested trees; and while the logging out of high risk trees is desirable, it is not an essential requirement.

C. Top-killed trees

There are many different kinds of top-killed trees and whether or not they are to be marked for treatment or salvage will depend upon the amount of infestation they contain, their merchantability, size and position on the area. In general the following rules will apply:

(1) "Infested" - throw into this class top-killed or fading trees under 20 inches d.b.h. which occur in Ips groups; top-killed trees over 20 inches d.b.h. which show woodpecker work on upper bole indicating D.b. attack; or top-killed trees in D.b. groups having over 50 percent of crown currently faded.

(2) "Dying - doubtful" - throw into this class all top-killed trees over 20 inches d.b.h. showing active current, progressive top-killing involving less than 50 percent of the crown; and the tree showing other signs of decadence which would give it a penalty score of 6 or more.

(3) "Risk trees" - throw into this class top-killed trees showing no signs of current progressive decline regardless of amount of top involved.

D. Killed trees - recently abandoned ("S" Trees)

These are trees killed within the last two years and now abandoned by insects, which contain merchantable volume. These trees will be marked for salvage provided the owner so desires. Adding such trees will increase the volume of salvage and will help to make logging economically feasible, but it will reduce the grade recovery.

Spotting rules for control or salvage

The following rules for spotting will be followed in handling each of these classes on areas to be treated by direct control or by salvage.

Spotting for direct control.

On inaccessible areas or those outside the limits of practical salvage logging, spotting will be restricted to "infested trees," as described under Class A, above, including top-killed trees defined as "infested."

Spotting for salvage control.

Within areas accessible to salvage logging (such zones should be clearly designated on the working map after consultation and agreement with the logging operators), spotting will include all "infested trees" (Class A above); "dying-doubtful trees" (as defined under B(1) above) provided the inclusion of such trees is agreed to by the owner; and recently killed abandoned trees (Class D above). The feasibility of salvage logging in most cases will be dependent upon the inclusion of these dead and dying trees and from the entomological standpoint the removal of all "doubtful trees," as well as "infested trees," is highly desirable.

Spotting technique.

Standard methods of spotting and mapping the areas to be treated will be followed as described in detail in Buckhorn's survey manual*.

All trees 12 inches d.b.h. and over will be tagged with a serially numbered 3x5 tag stuck in an axe niche. The serial number preceded by "T" (treat) will be marked with crayon on a blaze on infested trees. Groups of poles will be included under one number and the card placed on the first tree of the group; in addition, all trees to be treated in groups of poles will be blazed and marked with a "T." Infested trees to be cut for treatment and salvage will be designated "TS" (treat and salvage). "Dying-doubtful" trees to be cut in salvage operations will be similarly serially numbered and the number preceded by "D-S" (dying-salvage). Abandoned trees to be salvaged will also be serially numbered and the number preceded by "S" (salvage).

Each spotter will fill out a spotting record showing (1) serial number (Spotter A will start his series with number "1" and run to "500" inclusive; Spotter B will start his series with "501" and run to "1,000" inclusive. After these series are used up each spotter will start again with his original number.), (2) "Killed by," (3) D.B.H. or number of poles, (4) number of logs (optional with owner) and (5) a check in 3 columns under T, D and S depending upon whether a tree is to be treated (T), dying and doubtful (D) or a salvage (S) tree. Merchantable trees checked under "T" and "D" will also be checked under "S."

* "Instructions for making Bark Beetle Surveys in the Virgin ponderosa pine stands of Oregon and Washington" by Walter J. Buckhorn. Forest Insect Laboratory, Portland, Oregon. June 1944. Mimeographed

Maps will be made on an 8-inch to the mile scale. The number of trees and poles in a group will be circled and the first and last serial number applicable to the group shown outside the circle. Copies of maps will be made for both treating and salvage crews. On areas where both treating and salvage are to be done, copies for treating crews will show all "T" trees circled in red, while copies for logging crews will show all "S" trees circled in orange.

Treating

The method of treatment will vary somewhat with the species to be controlled and whether or not the infested trees are within or outside the logging zone. These methods may be modified by the project supervisor to meet special conditions.

Outside logging zone.

All Ips-infested trees either in poles, under 16 inches d.b.h., or tops of larger trees will be cut, piled and burned. All D.b. infested trees will also be cut, piled and burned if in trees less than 16 inches d.b.h. or in larger trees in groups if these can be conveniently piled and completely burned in a deck. Larger D.b. trees (normally those larger than 16 inches d.b.h.) if occurring singly or in small groups of less than 3 trees will be felled, the top of the infested portion of the log peeled and the infested bark burned along the side of the log. Trees infested with flatheads and other species will be similarly treated depending upon size.

Green "bug-free" basal portions of the trunk of felled top-killed trees will not be treated unless they can be conveniently included in burning decks. Low stumps of larger trees need not be peeled and should be excluded from fire lines to save predators hiberating at ground line.

Within logging zone.

Unmerchantable infested trees, poles and tops of infested trees (marked "T") will be treated in the same manner as described above.

Merchantable infested trees (marked "TS") should be salvaged and the bark burned at the mill before the beetles emerge; and the tops and limbs burned in the woods.

Dying-doubtful trees (marked "DS") after salvage should have the unmerchantable tops and limbs similarly burned by the treating crews.

Abandoned salvage trees (marked "S") need not be treated.

In all cases the treating crews should mark the letter and number of treated trees on the stumps for subsequent identification and checking.

Timing of Treatment

Ips are now overwintering largely as adults and pupae. These will start emerging early in the spring with the first warm weather. Therefore all group infestations of Ips should be treated at least before the 15th of April and preferably before the 15th of March.

D.b. are overwintering largely in the larvae stage. Bark infested with D.b. should be burned at least before the 15th of May and preferably before the end of April.

Uninfested salvageable trees can be logged out at any time.

Project Responsibility

Dr. Ralph C. Hall has been designated as the Forest Insect Laboratory's representative in charge of the entomological phases of this project and will be responsible for supervising the entomological requirements outlined in this work plan on a uniform basis for all ownerships. He will have as his assistants Mr. W. J. Buckhorn (on temporary detail) to work with the State Division of Forestry, Mr. C. E. Startt assigned to the Forest Service cooperation and such other personnel from the Laboratory as may be assigned.

F. P. Keen
Entomologist, in Charge

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
DIVISION OF FOREST INSECT INVESTIGATIONS

INSECT CONTROL UNITS

BURNEY-Mc CLOUD INSECT CONTROL PROJECT

SHASTA AND SISKIYOU COUNTIES, CALIFORNIA

SCALE

0 1 2 3 4 5 6
MILES

R.3W. R.2W. R.1W. R.1E. R.2E. R.3E. R.4E. R.5E.

T.41 N. T.40 N. T.39 N. T.38 N. T.37 N. T.36 N. T.35 N. T.34 N. T.33 N. T.32 N. T.31 N.

McCLOUD FLATS

BEAR CREEK

CLARK CREEK

GOOSE VALLEY

BURNEY FLAT

DRY LAKE

DOYLE BUTTE

HAT CREEK

THOUSAND LAKES

BIG SPRINGS

F O R.

SHASTA

LASSEN

VOLCANIC

CO. CO.

TO MT. SHASTA

TO REDDING

5 - R.O.
1 - FCC
3 - Nelson
5 - Wall
1 - Scott Lk. Co. (Berry)
1 - McCloud Lk. Co. (Newman)
2 - Los Angeles (1- Stabler Main)
1 - Fruit Growers (Tom Olin)
1 - C.L. Kolbe
1 - FPK
1 - file

1 -
1 - W.B. MacMillan (Sac. Indian Agency)
1 - Floyd D. Phillips (Reg. Forester, Portland, Ore.)
1 - O.F. Starr